National University of Computer and Emerging Sciences LHR

Course	CN Lab	Course Code	CL3001
Program	BS CS	Semester	Fall 2023
Duration	2 hr 30 min	Total Marks	50
Date	24/Oct/2023	Weightage	25%
Section	5H1 & H2	Total Parts	3 parts
Student Name		Student Roll #	
Submission Link: (mandatory) Then submit on GCL also. Submit all files, input files you use, compiled word file with answers and screenshots and .c files as well.	\\cactus1\Xeon\Fall 2023\CN Lab Mid\5H Exam **Submission File NAME: ROLL#_SEC_NAME**		

Rules:

• Understanding the question statement is also part of the exam, so **do not ask any questions** whatsoever. In case of any ambiguity, make suitable assumptions.

• You have to complete the exam in 2 hours and 30 minutes including the submissions, no late submissions will be acceptable.

• Midterm exam **helping materials are placed on your Google classroom.**

• **Rename your submission folder to your Roll number in the format 20L-XXXX**, by putting your roll

number. Submission path is your google classroom. Folder has already been created for this purpose.

• Your code should be indented and commented properly. Use meaningful variable names. Failure to comply will result in marks deduction. **Submit screenshots where suitable**.

• Any kind of cheat sheet/code if found in your PC will result in immediate disqualification from midterm exam and 'F' as final grade in Computer Networks Lab. So, make sure you delete everything from Desktop of your windows as well as Ubuntu. Also delete all the files permanently from Recycle Bin and Trash respectively for Windows and Ubuntu. Delete all files from your Z Drives before starting the exam.

• **If any student is found browsing any website, his/her exam will be CANCELLED IMMEDIATELY.**

• INTERNET USAGE IS ONLY ALLOWED TO MAKE SUBMISSION.

• It is your responsibility to save your code from being copied. All matching codes will be considered cheating cases. **PLAGIARISM will result in forwarding of case to Disciplinary Committee.**

• In case of missing or corrupted submission, ZERO marks will be awarded.

• You are immediately disqualified from the exam if:

i. You are seen talking, whispering, borrowing or looking at someone's PC.

ii. A USB is found attached to your PC.

iii. You are seen using cell phone/smart watch.

iv. You are caught accessing internet.

Objective: [1x10 Marks]

Instructions: Select and **BOLD+HIGHLIGHT** the answer part.

Example: This is a CN Lab mid?

A. Yes
B. No

1. What is Wireshark, and what is its primary purpose in computer networking?

A. Network simulation tool

B. Network configuration tool

C. Network monitoring and packet analysis tool

D. Network security tool

2. Which layer of the OSI model does Wireshark primarily operate at?

A. Data Link Layer

B. Transport Layer

C. Application Layer

D. Network Layer

3. Which function is used to create a TCP socket in C?

A. udp_socket()

B. create_socket()

C. socket()

D. open_socket()

4. In a TCP client-server application, which side initiates the connection using the connect() function?

A. Client

B. Server

5. What is the key difference between TCP and UDP socket programming?

A. TCP is connectionless, while UDP is connection-oriented.

B. UDP is connectionless, while TCP is connection-oriented.

C. Both TCP and UDP are connectionless.

D. Both TCP and UDP are connection-oriented.

6. Which function is used to send data over a UDP socket in C?

A. sendto()

B. write()

C. send()

D. udp_send()

7. Which function is used to open a file in C for reading?

A. open_file()

B. read_file()

C. fopen()

D. open()

8. What does the fread() function return in C when it reaches the end of a file?

A. -1

B. 0

C. EOF

D. NULL

9. Which function is used to close a file in C after reading or writing operations?

A. close()

B. fclose()

C. file_close()

D. end_file()

10. What is the purpose of the fseek() function in C file handling?

A. To set the file pointer to the beginning of the file.

B. To read data from a file.

C. To move the file pointer to a specified location within the file.

D. To close the file.

Tasks:

Task 1: [20 marks]
Use the http-ethereal-trace-2 packet trace to answer the questions below and apply the RELEVANT filter

Answer the following questions:

1. Inspect the contents of the first HTTP GET request from your browser to

the server. Do you see an "IF-MODIFIED-SINCE" line in the HTTP GET?

Screenshots + Code/Answer:

2. Inspect the contents of the server response. Did the server explicitly return

the contents of the file? How can you tell from the Packet Bytes Window?

Screenshots + Code/Answer:

3. Now inspect the contents of the second HTTP GET request from your

browser to the server. Do you see an "IF-MODIFIED-SINCE:" line in the

HTTP GET? If so, what information follows the "IF-MODIFIED-SINCE:"

header? What is meant by this information?

Screenshots + Code/Answer:

4. What is the HTTP status code and phrase returned from the server in

response to this second HTTP GET? Did the server explicitly return the

contents of the file? Explain your answer.

Screenshots + Code/Answer:

Task 2: [20 marks]

Create a UDP-based Library Catalog System where users can check the availability of books and request to borrow them using data packets sent from their host machines. Each user must send a message with the following format:

- **SEARCH BookTitle** (e.g., SEARCH "Introduction to Programming")

- **BORROW BookID** (e.g., BORROW 123)

The system must process the search and borrow packets accordingly and maintain the book catalog. Your system should cater to the following cases:

Book Search:

- When a user sends a search packet (e.g., SEARCH "Introduction to Programming"), the system should search the catalog for books with titles that match the query.

- If a match is found, the system should respond with a message listing the available books, e.g., "Available books: BookID 123 - 'Introduction to Programming,' BookID 456 - 'Programming in Python.'"

Book Borrowing:

- If a user sends a borrow packet (e.g., BORROW 123), the system should check if the requested book is available.

- If the book is available, the system should mark it as borrowed and respond with a message confirming the borrow, e.g., "You have borrowed 'Introduction to Programming' (BookID 123). Please return it within 14 days."

- If the book is already borrowed, the system should respond with a message indicating that the book is unavailable, e.g., "The book 'Introduction to Programming' (BookID 123) is already borrowed."

Invalid Requests:

- If a user sends an invalid packet (e.g., BORROW 999 for a non-existent BookID), the system should respond with a message indicating that the request is invalid, e.g., "Invalid request. BookID 999 does not exist."

Challenge:

- Implement your system to handle multiple users concurrently and ensure that the book catalog is updated accurately in real-time.

Input File:

Make an INPUT file of txt or csv type. Sample contents:

BookID	Title	Author	Status
123	Introduction to Programming	John Smith	Available
456	Programming in Python	Jane Doe	Available
789	Data Structures and Algorithms	Michael Johnson	Borrowed
101	Computer Networks for Beginners	Alice Brown	Available

Screenshots + Code/Answer: